



# HOW TO WELD TPO WITH A HAND WELDER

## » Purpose

To teach roofers how to weld TPO seams with a hand welder using the right technique, this results in strong, clean seams.

## The importance of the welding process

If seams are not welded right, **the roof will leak**. Hand welding is used for detail work and tight areas where automatic welding machines can't go. A clean, even weld makes the roof last.



## Hand Weld Vs Machine Weld:

**We only hand weld when we cant weld using a machine due to access or availability.**

Machine welds are easier to get right and less likely for failure. **Use welding robot whenever possible.**

1

## Clean and Prepare the Seam

- Always clean the seam before hand welding.
- **If the seam is dirty** start with simple green or other similar detergent. If the seam is not dirty move to next step
- Then use Xylene for TPO, or Acetone for PVC. A small amount of these gets the job done, **don't over apply these, this can effect the weld.**
- Wait a few minutes after using the cleaner to let it "flash off". "Flash off" means for it to dry and evaporate into the air.
- The seam must be clean and dry, before welding.



**Cleaning well is key before welding**

## 2

## Set Your Hand Welder

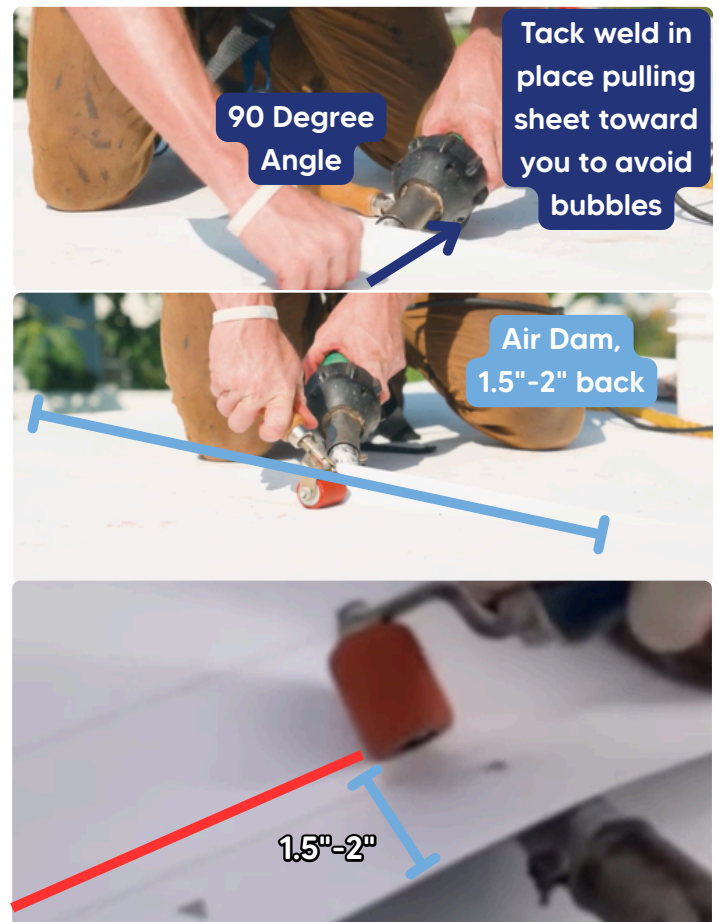
- Set your hand welder heat to 950-1050 degrees or setting “7-8” depending on weather and membrane thickness. Note: unsupported TPO is lower, 6-7 setting.
- **Run a wire brush often on your heat welder tip to ensure it is clean and prepared. Welder tips get dirty over time and will cause welding failures if not kept clean.**
- Always check with your project manager if unsure of equipment settings.



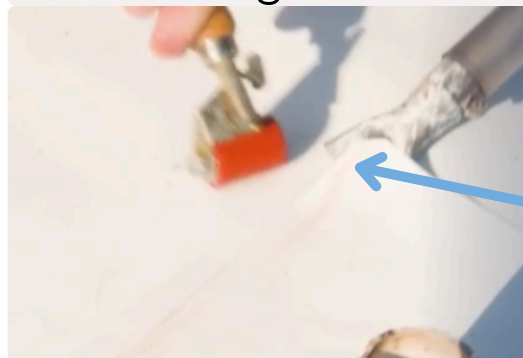
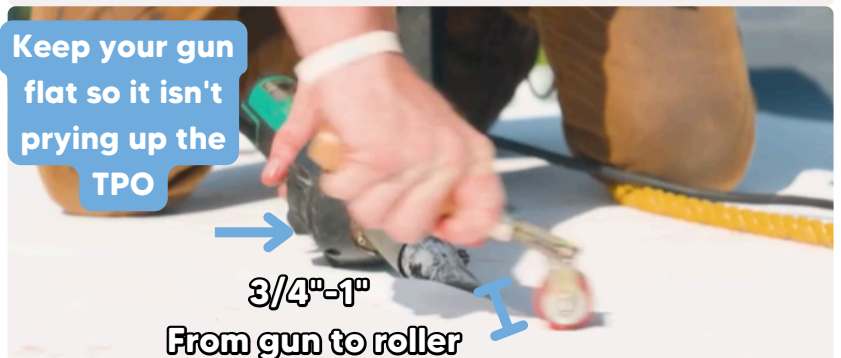
## 3

## Weld an “Air Dam” or “Back Weld”

- Start with tacking the material down in one location to set the TPO in place
- Then perform a full weld a few inches back from the TPO edge called an “air dam”.
- An air dam is an initial weld behind the final weld that works to stop bubbles and gives backup protection.
- Push firm pressure outward always so the sheet stays tight with no gaps or bubbles.
- When welding keep your gun “flat” otherwise it can act to pry the TPO up.



- Remember welding is 3 simple things brought together: hot air, pressure, and speed. In hand welding, you control the pressure and speed, your gun setting controls the heat.
- You want a minimum of 1.5" continuous heat weld.
- **Keep your nozzle at the same angle as your roller.**
- Let a little bit of the nozzle stick out from the seam and should be at a 45 degree angle same angle as roller.
- Roll flat with steady **with firm, even pressure.** Roller should be 1" behind the welder. **Do not use the corner or edge of roller.**
- Keep your speed and weld consistent—don't stop and start.



## Common Welding Mistakes to Avoid

- With TPO you should NOT see a "bleed out" (material oozing out) if you do you are overheating.
- **Not doing a "back weld" or "air dam" first.** This is a very high cause of bad hand welds, leaks and can cause bubbles.
- Too little pressure 20 pounds is the sweet spot, too little and you may not get a weld. Too much pressure can also create a problem, don't put your body weight into the roller.
- Gun/roller at different angles.
- Gun not sticking out past TPO, result in not welding the edge.



# ✗ More Welding Mistakes

- Welding without an air dam.
- Welding dirty seams.
- Welding at wrong setting, to hot or to cold
- Changing speed or stopping and starting to often, **stay smooth and steady.**



## PROBE YOUR WORK!

Always probe your work. Let it cool for 5 minutes and check it well with a probe. It doesn't matter how good you are at welding, if you don't probe check you will end up with a bad weld that can cause a leak.



## Final Checks :

- ✓ Seam cleaned and prepared with detergent + seam cleaner
- ✓ Air dam welded tight with no bubbles
- ✓ Hand welder set to proper heat
- ✓ Nozzle and roller in line, steady pressure
- ✓ Weld finished smooth, tight, and even.



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